

DATA VALIDATION REPORT
Portland Harbor RI/FS
Archived Sediment Sampling,
PCB Congeners by EPA Method 1668
Alta Analytical

This report documents the review of analytical data from the analyses of sediment samples and the associated laboratory and field quality control (QC) samples. Alta Analytical Laboratory, Inc., El Dorado Hills, California, analyzed the samples. Refer to the **Sample Index** for a list of the samples.

I. DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables, with the exceptions noted below. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

Extracts were analyzed separately for PCB169 in order to achieve lower detection limits. The standards associated with the analysis of PCB169 were not submitted initially. The laboratory was contacted 9/7/05 and requested to submit the standards associated with these analyses. The necessary data for SDG 26445 was received 9/15/05. The necessary data for all other SDG were received 10/20/05.

SDG 26445: Four pages of the quantitation report for the method blank associated with QC Batch 7020 were not included with the raw data. The laboratory was contacted on 8/31/05 and the pages were submitted on 9/1/05. No further action was necessary.

SDG 26445 v2: This SDG consisted only of a duplicate of Sample LW2-G105 from SDG 26445.

II. EDD TO HARDCOPY VERIFICATION

A complete (100%) verification of the electronic data deliverable (EDD) results was performed by comparison to the hardcopy laboratory data package. Laboratory QC results were also verified (10%). No errors were found.

II. TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

- | | |
|--|---|
| 1 Technical Holding Times and Sample Receipt | 1 Matrix Spikes/Matrix Spike Duplicates (MS/MSD) |
| 1 GC/MS Tuning | 2 Ongoing Precision and Recovery (OPR) |
| Initial Calibration (ICAL) | 2 Laboratory Duplicate |
| 2 Calibration Verification (CVER) | 1 Field Replicates |
| Isomer Specificity | Compound Identification |
| 2 Laboratory Blanks | 1 Reporting Limits |
| 1 Field Blanks | 1 Calculation Verification (full validation only) |
| 2 Labeled Compound Recovery | |

¹ *Quality control results are discussed below, but no data were qualified.*

² *Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed below.*

Technical Holding Times and Sample Receipt

The QAPP-required holding time criterion is one (1) year from date of sampling to date of extraction. The QAPP-required holding time criterion for extracts is 40 days from extraction to analysis. Several samples were extracted outside the one-year holding time however, since the samples were properly preserved at -20°C and PCB congeners are known to be extremely stable, no action was taken. All extracts were analyzed within the holding time criterion.

SDG 26445 and 26445 v2: The sample cooler was received by the laboratory at -49.6°C. This temperature outlier was judged to have no impact on the data and no action was taken. Sample LW2-G178 was received with a broken cap. The laboratory notified the client and was instructed to proceed with the analysis. No action was taken on this basis.

SDGs 26478, 26479, 26480, 26481 & 26482: Three of the four sample coolers were received by the laboratory outside the control limits, at 0.4°, 0.6°, and 0.6°C. These temperature outliers were judged to have no impact on the data and no action was taken. Sample LW2-G351 (of SDG 26482) was received with a broken cap and Samples LW2-G230 and LW2-G347 (of SDG 26478) were received with broken jars. No action was taken on these occurrences.

GC/MS Tuning

SDG 26480: Due to a power outage, no GC/MS tune was analyzed at the end of the 12-hour shift that was opened by the GC/MS tune analyzed 8/20/05 at 23:43. As all other tunes have been acceptable and all labeled compound recoveries in the associated samples were acceptable no action was taken.

Calibration Verification (CVER)

SDG 26445: The amounts recovered for PCB1, PCB2, PCB3 in the CVER analyzed 7/18/05 at 18:17 were greater than the upper control limit. Positive values for these analytes were estimated (J-5B) in the associated samples.

The amounts recovered for $^{13}\text{C}_{12}$ -PCB206 and $^{13}\text{C}_{12}$ -PCB209 in the CVER analyzed 7/21/05 at 19:00 were greater than the upper control limit. The amounts recovered for the associated native compounds were acceptable and no action was taken.

SDG 26478: The amounts recovered for $^{13}\text{C}_{12}$ -PCB156, $^{13}\text{C}_{12}$ -PCB157, $^{13}\text{C}_{12}$ -PCB189 and $^{13}\text{C}_{12}$ -PCB209 in the CVER analyzed 7/21/05 at 19:00 were greater than the upper control limit. The amounts recovered for the associated native compounds were acceptable and no action was taken.

SDG 26480: Due to a power outage, no closing CVER was analyzed for the 12-hour shift opened by the GC/MS tune analyzed 8/20/05 at 23:43 (see above). As all CVER in this SDG were acceptable and all labeled compound recoveries in the associated samples were acceptable no action was taken.

Laboratory Blanks

In order to assess the impact of laboratory blank contamination on the reported sample results, action levels at five times the blank concentrations are established. If the concentrations in the associated field samples are less than the action levels, the results are qualified as not detected (U-7). If the result is also less than the reporting limit, the result is elevated to the reporting limit.

SDG 26445: A positive value for PCB169 was reported in the laboratory blank associated with QC Batch 7020. The value for PCB169 was qualified as not detected (U-7) in the associated sample, LW2-G004.

A positive value for PCB77 was reported in the laboratory blank associated with QC Batch 7005. All positive values for this analyte were greater than the established action level in the associated samples and no qualifiers were assigned.

SDG 26445 v2: Positive values for PCB11, PCB47, PCB77, and PCB169 were reported in the laboratory blank. Positive values for PCB11 and/or PCB169 were qualified as not detected (U-7) in the sample.

SDG 26472: Positive values for PCB18, PCB77, and PCB169 were reported in the laboratory blank. Positive values for one or more of these analytes were qualified as not detected (U-7) in all samples in this SDG.

SDG26478: A positive value for PCB169 was reported in the laboratory blank associated with QC Batch 7068. Positive values for PCB169 were qualified as not detected (U-7) in most samples.

Positive values for PCB11, PCB47, PCB77, and PCB169 were reported in the laboratory blank associated with QC Batch 7088. A positive value for PCB169 was qualified as not detected (U-7) in the associated sample, LW2-G399.

SDG 26479: Positive values for PCB11, PCB47, PCB77, PCB169, and PCB189 were reported in the laboratory blank associated with QC Batch 7080. Positive values for one or more of these analytes were qualified as not detected (U-7) in most of the samples in this SDG.

SDG 26480: A positive value for PCB169 was reported in the laboratory blank associated with QC Batch 7081. Positive values for PCB169 were qualified as not detected (U-7) in most samples.

Positive values for several PCB were reported in the laboratory blank associated with QC Batch 7099. A positive value for PCB169 was qualified as not detected (U-7) in the associated sample, LW2-G197-2.

SDG 26481: Positive values of PCB77 and PCB169 were reported in the laboratory blank associated with QC Batch 7108. Positive values for PCB169 were qualified as not detected (U-7) in most of the associated samples.

Positive values for PCB28, PCB47, and PCB169 were reported in the laboratory blank associated with QC Batch 7133. These analytes were either greater than the action level or not detected in the associated sample, LW2-G225, and no action was taken.

SDG 26482: Positive values for PCB11, PCB47, PCB77, and PCB169 were reported in the laboratory blank. Positive values for PCB11 and/or PCB169 were qualified as not detected (U-7) in most of the samples in this SDG.

Field Blanks

Six equipment rinsate samples were reported with the surface sediment samples. After qualifiers based on laboratory blanks were assigned, no positive values remained in blanks LW2-G915, LW2-G920, and LW2-G911. Positive values for several PCB were reported in blanks LW2-G919, LW2-G945, and LW2-G906. All results in the equipment rinsates were significantly less than the results in the sediment samples, even after the action levels were established. No further action was necessary.

Labeled Compounds

Labeled compounds were added to all field and QC sample to monitor extraction and analysis efficiency. With the exceptions noted below, all labeled compound percent recovery (%R) values were acceptable. If the labeled compound %R outliers indicated a potential high bias, positive results for associated target analytes were estimated (J-13). If the labeled compound %R values indicate a potential low bias, positive results and detection limits for associated target analytes were estimated (J/UJ-13).

SDG 26445:

- Sample LW2-G019 - $^{13}\text{C}_{12}$ -PCB208 (high bias)
- Sample LW2-G092 - $^{13}\text{C}_{12}$ -PCB208 (high bias)
- Sample LW2-G096 - $^{13}\text{C}_{12}$ -PCB208 (high bias)
- Sample LW2-G036 - $^{13}\text{C}_{12}$ -PCB208 and $^{13}\text{C}_{12}$ -PCB209 (high bias)
- Sample LW2-G178 - $^{13}\text{C}_{12}$ -PCB206, $^{13}\text{C}_{12}$ -PCB208, and $^{13}\text{C}_{12}$ -PCB209 (high bias)

SDGs 26445 v2, 26478 & 26482: The %R value for $^{13}\text{C}_{12}$ -PCB1 (low bias) in the laboratory blank associated with QC Batch 7088. Qualifiers are not assigned to QC samples and no action was taken.

SDG 26480: The %R values for $^{13}\text{C}_{12}$ -PCB1, $^{13}\text{C}_{12}$ -PCB3, and $^{13}\text{C}_{12}$ -PCB4 were less than the lower control limit in the laboratory blank associated with QC batch 7081. Qualifiers are not assigned to QC samples and no action was taken. Other outliers are:

- Sample LW2-G473 - $^{13}\text{C}_{12}$ -PCB1, $^{13}\text{C}_{12}$ -PCB3, $^{13}\text{C}_{12}$ -PCB4, and $^{13}\text{C}_{12}$ -PCB9 (low bias)

SDG 26481: The %R values for $^{13}\text{C}_{12}$ -PCB1 and $^{13}\text{C}_{12}$ -PCB3 were less than the lower control limit in the laboratory blank associated with QC batch 7133. Qualifiers are not assigned to QC samples and no action was taken. Other outliers are:

- Sample LW2-G225 - $^{13}\text{C}_{12}$ -PCB1, $^{13}\text{C}_{12}$ -PCB3, $^{13}\text{C}_{12}$ -PCB4, $^{13}\text{C}_{12}$ -PCB9, $^{13}\text{C}_{12}$ -PCB19, and $^{13}\text{C}_{12}$ -PCB54 (low bias)

Matrix Spikes/Matrix Spike Duplicates

Matrix spikes/matrix spike duplicates (MS/MSD) were not analyzed. Accuracy was evaluated using the labeled compound and OPR recovery values. Precision was evaluated using the laboratory duplicate analysis.

Ongoing Precision and Recovery

SDGs 26445 v2 & 26482: The PCB15 %R value was greater than the upper control limit in the ongoing precision and recovery (OPR) associated with QC Batch 7088. Values for PCB15 were estimated (J-10) in all associated samples.

SDG 26478: The amounts recovered for PCB1 and PCB3 were less than the lower control limit in the OPR associated with QC Batch 7068. Positive values and/or reporting limits were estimated (J/UJ-10) in the associated samples.

The PCB15 %R value was greater than the upper control limit in the OPR associated with QC Batch 7088. A positive value for PCB15 was estimated in the associated sample, LW2-G399.

Laboratory Duplicate

Laboratory duplicate analyses were performed with each batch. All laboratory duplicate precision results were within the acceptance criteria [relative percent difference (RPD) values less than 50% for analytes with values greater than five times the reporting limit (RL), or an absolute difference of two times the RL for analytes with values less than five times the RL], with the exceptions noted below.

SDG 26445/26445 v2: Duplicate analysis was performed on Sample LW2-G105. The parent sample was submitted in SDG 26445 and the duplicate in SDG 26445 v2. The precision results for PCB67, PCB86, PCB111/115, PCB113, PCB175, and PCB198 were outside the acceptance criteria. Values for these analytes were estimated (J/UJ-9) in both the parent sample and the duplicate.

SDG 26478: The laboratory performed duplicate analysis on Sample LW2-G426. The values for PCB22, PCB113, and PCB181 were outside the acceptance criteria. Positive value and/or reporting limits for these analytes were estimated (J/UJ-9) in both the parent sample and the duplicate.

SDG 26479: The laboratory performed duplicate analysis on Sample LW2-G439. The values for PCB1, PCB73, and PCB113 were outside the acceptance criteria. Values for these analytes were estimated (J -9) in both the parent sample and the duplicate.

SDG 26480: The laboratory performed duplicate analysis on Sample LW2-D1-1. All values were acceptable.

SDG 26481: The laboratory performed duplicate analysis on Sample LW2-G392. The values for PCB113 and PCB189 were outside the acceptance criteria. Values for these analytes were estimated (J/UJ-9) in both the parent sample and the duplicate.

SDG 26482: The laboratory performed duplicate analysis on Sample LW2-G198. The values for multiple analytes were outside acceptance criteria. Values for the outlying analytes were estimated (J-9) in both the parent sample and the duplicate.

Field Replicates

No field replicate sets were analyzed with these SDG.

Reporting Limits

Analytical concentration goals (ACG) were specified in the QAPP for specific toxic PCB (PCB77, PCB81, PCB105, PCB106/118, PCB114, PCB123, PCB126, PCB156, PCB157, PCB167, PCB169, and PCB189). To try to meet the project ACG, the laboratory reported non-detects at the method detection limits (MDLs), adjusted for sample size, percent moisture, and any dilution factor. For several of the most toxic coplanar congeners (such as PCB77 and PCB169), the laboratory also concentrated the extracts, performed additional cleanups, and then reanalyzed the extract to get the lowest possible detection limits.

The ACG were met for most of the samples, in that the compound was either detected, or the detection limit was less than the stated ACG. When the ACG and MRL were not met, it was due to the need to extract smaller sample aliquots and/or perform dilutions due to the elevated concentrations of target analytes present in the samples.

PCB169 was detected at low levels in most of the samples and in the associated method blanks. After qualifiers based on method blank contamination were issued, most of the PCB169 results were restated as not detected, with elevated detection limits. Many of these restated detection limits were greater than the PCB169 ACG of 0.01 pg/g (dry weight).

Samples affected by the need to extract smaller sample aliquots and/or perform dilutions due to the elevated concentrations of target analytes present in the samples are discussed below.

SDG 26445: Samples LW2-G009 and LW2-G019 had elevated reporting limits due to the laboratory extracting a limited sample aliquot. Results were reported from dilution analyses (usually 5x) for most other samples.

SDG 26478: Sample LW2-G280 had elevated reporting limits due to limited extraction aliquot. Some or all values were reported from dilution (5x) for Samples LW2-G426, LW2-G028, LW2-G452, LW2-G332, LW2-G438, and LW2-G149.

SDG 26479: Samples LW2-G268, LW2-G310, LW2-G093, and LW2-G402 G453 had elevated reporting limits due to limited extraction aliquot. Some values were reported from dilution for Sample LW2-G308 (5x).

SDG 26480: Samples LW2-G503, LW2-G473, LW2-G477, and LW2-G453 had elevated reporting limits due to limited extraction aliquot. Some or all values were reported from dilution (5x) for Samples LW2-G416, LW2-G355, LW2-G320, LW2-G327 and LW2-G197-2. Also, the laboratory reported and elevated detection limit for PCB114 in Sample LW2-G355 due to interference.

SDG 26481: Samples LW2-G390, LW2-G382, and LW2-G225 had elevated reporting limits due to limited extraction aliquot. Some or all values were reported from dilution (5x) for Samples LW2-G457, LW2-G386, LW2-G139, LW2-G293, LW2-G373, and LW2-G273.

SDG 26482: Samples LW2-G282 and LW2-G494 had elevated reporting limits due to limited extraction aliquot. Most of the trichlorinated PCB congeners were reported from a dilution (5x) in Sample LW2-G198 and the duplicate performed on that sample.

Calculation Verification

SDG 26445: Calculation verification was performed on this SDG. No transcription or calculation errors were found.

III. OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the labeled compound and OPR, with the exceptions noted above. Precision was acceptable as demonstrated by the laboratory duplicate RPD values, with the exceptions noted above.

Data were estimated due to labeled compound and OPR %R outliers, CVER outliers, and laboratory duplicate precision outliers. Data were qualified as not detected due to contamination in the associated laboratory blanks.

All data, as qualified, are acceptable for use.



EcoChem, Inc.

Environmental Science and Chemistry

DATA QUALITY EVALUATION

PORTLAND HARBOR

Surface Sediments

Polychlorinated Biphenyl (PCB) Congeners, Method 1668

Prepared for:

Integral Consulting
7900 SE 28th Street, Suite 300
Mercer Island, Washington 98040

Integral Project: B01-01-48C

Prepared by:

EcoChem, Inc.
405 Westland Building
100 South King Street
Seattle, Washington 98104-2885

EcoChem Project: C22105

November 11, 2005

Approved for Release:

Eric Strout
Project Manager/Technical Director
EcoChem, Inc.

DATA QUALITY EVALUATION

Polychlorinated Biphenyl (PCB) Congeners

BASIS OF DATA EVALUATION

A total of 104 surface sediment samples were analyzed for polychlorinated biphenyl (PCB) congeners for the Portland Harbor Phase 2 RI/FS. An additional two samples designated “downstream” and two samples designated “upstream” are included with this report. Six (6) rinsate blanks were also analyzed to monitor the field collection process. Alta Analytical Laboratories, El Dorado Hills, California, completed all PCB congener analyses. A complete Sample List is provided as **Appendix A**.

The data were validated using guidance and quality control (QC) criteria documented in the analytical method (E1668); *Guidance on Environmental Data Verification and Validation* (EPA 2002c); *Portland Harbor RI/FS, Round 2, Quality Assurance Project Plan (QAPP) Addendum 2: PCB Congener Analysis in Sediment Samples* (Integral 2004); *EPA Region 10 SOP for the Validation of Method 1668 Toxic, Dioxin-like PCB Data* (EPA 1995); and *National Functional Guidelines for Organic Data Review* (USEPA 1999). EcoChem, Inc. Seattle, Washington, completed all data verification and validation.

Data qualifier definitions, reason codes, and validation criteria are included as **Appendix B**. Data validation reports, which discuss individual findings for each quality control element, are provided in **Appendix C**. Data validation worksheets and all communication records are organized by SDG and will be kept on file at EcoChem.

PROCESS FOR DATA VALIDATION

All electronic data deliverables (EDD) were verified by comparing 100% of the field sample results and 10% of the QC sample results to the hardcopy data package.

Approximately eighty percent (80%) of the data received a Level III validation, which included evaluation of:

- Package completeness
- Sample chain-of-custody and sample preservation
- Analytical holding times
- Blank contamination
- Precision (replicate analyses)
- Accuracy (compound recovery)
- Detection limits
- Instrument performance (initial calibration, continuing calibration, sensitivity and degradation)

All other data received full (Level IV) data validation, which also included evaluation of quantitation (transcription and calculation checks), reported compound identification, and review of the raw data.

A dual-tier system of primary and secondary reviewer is utilized to ensure technical correctness and quality control of the validation process. The validation is documented using standardized and controlled worksheets and spreadsheets. These worksheets are completed for each SDG, documenting all deficiencies, outliers and subsequent qualifiers.

After qualifiers are entered into the EcoChem database, 100% verification of the qualifiers is completed by a second party to ensure the accuracy and completeness of the EcoChem database. Interpretive qualifiers are then applied to the field samples and qualified data is ultimately exported to the Portland Harbor Project Database (Integral).

SUMMARY OF DATA VALIDATION

The PCB congener data for the surface sediment samples were acceptable. A total of 337 data points (1.7% of all congener data points) were estimated because control limits were exceeded in one or more laboratory QC samples or procedures. These qualified data points may have a larger associated bias or may be less precise than unqualified data, but are usable for the intended purpose.

The laboratory data were evaluated in terms of completeness, holding times, instrument performance, bias, and precision. The results of the QC procedures used during sample analyses are discussed below.

Completeness of Data Set

Completeness is defined as the total number of usable results (results that were not rejected during data validation) divided by the total results reported by the laboratory. The results reported by the laboratory were 100% complete for the surface sediment PCB congener analyses.

Holding Times and Sample Preservation

The surface sediment samples were collected August through November, 2004 and originally shipped to Colombia Analytical Services (CAS). The samples were archived at CAS and preserved by freezing at -20°C. The samples selected for PCB congener analysis were shipped by CAS to Alta in summer 2005. Although some coolers were received at Alta with temperatures above or below -20°C, the samples were again placed in freezers until extraction and analysis. No qualifiers were applied.

The QAPP-required holding time criterion is one (1) year from date of sampling to date of extraction. The QAPP-required holding time criterion for extracts is 40 days from extraction to analysis. Several samples were extracted outside the one-year holding time however, since the samples were properly preserved at -20°C and PCB congeners are known to be extremely stable, no action was taken. All extracts were analyzed within the holding time criterion.

Instrument Performance

Initial and continuing calibrations were completed for all target analytes and met the criteria for frequency of analysis. All initial calibrations met all acceptance criteria.

Overall, the continuing calibration percent difference (%D) values indicate acceptable instrument stability. When %D outliers were present, the potential bias was determined. If the %D outlier indicated a low bias, associated positive results and detection limits were estimated (J or UJ). If the %D outlier indicated a high bias, only associated positive results were estimated (J). Seventeen (17) positive results (0.08% of all sediment congener results) were estimated (J).

All other instrument performance criteria were met by the laboratory.

Method Blank Analyses

To assess the impact of each blank contaminant on the reported sample results, an action level is established at five times (5X) the concentration detected in the blank. If a contaminant is detected in an associated field sample and the concentration is less than the action level, the result is qualified as not detected (U). If the result is also less than the reporting limit, then the result is elevated to the reporting limit. No action is taken if the sample result is greater than the action level, or not detected.

Method blanks are used to evaluate all associated samples, including field blanks. Any remaining positive results in the field blanks are used to evaluate all associated samples.

Method blanks were analyzed at the appropriate frequency. One or more target analytes were detected in each of the method blanks. A summary of contaminant levels, associated samples, and action levels is provided in the data validation worksheets. Ninety-two (92) results (0.45% of all surface sediment PCB congener results) were qualified as not detected based on method blank contamination.

Accuracy

Labeled Compound Recoveries

Labeled compounds were added to all field and QC samples. The recoveries reported by the laboratory typically met the criteria for acceptable performance; however, labeled compound recovery outliers were present in several samples. If the outlier indicated a potential high bias only the associated positive results were estimated (J). If the outlier indicated a potential low bias, the associated positive results and reporting limits were estimated (J or UJ). A total of 58 results (0.29 percent of all surface sediment PCB Aroclor results) were estimated based on labeled compound recovery outliers.

Matrix Spike Recoveries

Matrix and duplicate matrix spike (MS/MSD) analyses were not performed. Accuracy was assessed using the labeled compound recoveries and LCS analyses.

Laboratory Control Sample Recoveries

LCS analyses (also called ongoing precision and recovery, or OPR) met the criteria for frequency of analysis. The recoveries reported by the laboratory met the criteria for acceptable performance.

Several of the recoveries reported by the laboratory for LCS analyses did not meet the criteria for acceptable performance. If the outlier indicated a potential high bias only the associated positive results were estimated (J). If the outlier indicated a potential low bias, the associated positive results and reporting limits were estimated (J or UJ). A total of 52 surface sediment results (0.26% overall) were estimated (J or UJ) during the quality assurance review because the control limits for LCS recovery were not met.

Precision

Laboratory duplicate analyses were performed with each analytical batch. With the exception of SDG 26480, precision results for one or more target analytes were outside the acceptance limits in each of the laboratory duplicate analyses.

For precision outliers, the associated target compounds were estimated (J or UJ) in both the parent sample and the laboratory duplicate analysis. A total of 210 surface sediment results, in both parent and duplicate samples (1.03% overall), were estimated based on precision outliers.

Method Detection Limits and Method Reporting Limits

Analytical concentration goals (ACG) were specified in the QAPP for specific toxic PCB (PCB77, PCB81, PCB105, PCB106/118, PCB114, PCB123, PCB126, PCB156, PCB157, PCB167, PCB169, and PCB189). To try to meet the project ACG, the laboratory reported non-detects at the method detection limits (MDLs), adjusted for sample size, percent moisture, and any dilution factor. For several of the most toxic coplanar congeners (such as PCB77 and PCB169), the laboratory also concentrated the extracts, performed additional cleanups, and then reanalyzed the extract to get the lowest possible detection limits.

The ACG were met for most of the samples, in that the compound was either detected, or the detection limit was less than the stated ACG. When the ACG and MRL were not met, it was due to the need to extract smaller sample aliquots and/or perform dilutions due to the elevated concentrations of target analytes present in the samples.

PCB169 was detected at low levels in most of the samples and in the associated method blanks. After qualifiers based on method blank contamination were issued, most of the PCB169 results were restated as not detected, with elevated detection limits. Many of these restated detection limits were greater than the PCB169 ACG of 0.01 pg/g (dry weight).

Field Quality Control Samples

Field Blanks

Six equipment rinsate blanks (LW2-G906, LW2-G911, LW2-G915, LW2-G919, LW2-G920, and LW2-G945) were reported with the surface sediment samples. Positive values for several PCB congeners were reported in blanks LW2-G919, LW2-G945, and LW2-G906. All results in the equipment blanks were significantly less than the results in the sediment samples, even after the action levels were established. No further action was necessary.

DATA VALIDATION QUALIFIER CODES

National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The following is an EcoChem qualifier that may also be assigned during the data review process:

DNR	Do not report; a more appropriate result is reported from another analysis or dilution.
-----	---

DATA QUALIFIER REASON CODES

1	Holding Time/Sample Preservation
2	Chromatographic pattern in sample does not match pattern of calibration standard.
3	Compound Confirmation
4	Tentatively Identified Compound (TIC) (associated with NJ only)
5A	Calibration (initial)
5B	Calibration (continuing)
6	Field Blank Contamination
7	Lab Blank Contamination (e.g., method blank, instrument, etc.)
8	Matrix Spike(MS & MSD) Recoveries
9	Precision (all replicates)
10	Laboratory Control Sample Recoveries
11	A more appropriate result is reported (associated with "R" and "DNR" only)
12	Reference Material
13	Surrogate Spike Recoveries (a.k.a., labeled compounds & recovery standards)
14	Other (define in validation report)
15	GFAA Post Digestion Spike Recoveries
16	ICP Serial Dilution % Difference
17	ICP Interference Check Standard Recovery
18	Trip Blank Contamination
19	Internal Standard Performance (e.g., area, retention time, recovery)
20	Linear Range Exceeded
21	Potential False Positives

Portland Harbor

Surface Sediment PCB Congener Sample List

Sample Description	Sample ID	Lab	SDG	Validation Level
Original sample	LW2-G004	Alta	26445	Full (Level IV)
Original sample	LW2-G007-1	Alta	26445	Full (Level IV)
Original sample	LW2-G009	Alta	26445	Full (Level IV)
Original sample	LW2-G016	Alta	26445	Full (Level IV)
Original sample	LW2-G019	Alta	26445	Full (Level IV)
Original sample	LW2-G025	Alta	26445	Full (Level IV)
Original sample	LW2-G036	Alta	26445	Full (Level IV)
Original sample	LW2-G067	Alta	26445	Full (Level IV)
Original sample	LW2-G086	Alta	26445	Full (Level IV)
Original sample	LW2-G090	Alta	26445	Full (Level IV)
Original sample	LW2-G092	Alta	26445	Full (Level IV)
Original sample	LW2-G095	Alta	26445	Full (Level IV)
Original sample	LW2-G096	Alta	26445	Full (Level IV)
Original sample	LW2-G103	Alta	26445	Full (Level IV)
Original sample	LW2-G105	Alta	26445	Full (Level IV)
Original sample	LW2-G109	Alta	26445	Full (Level IV)
Original sample	LW2-G112	Alta	26445	Full (Level IV)
Original sample	LW2-G117	Alta	26445	Full (Level IV)
Original sample	LW2-G178	Alta	26445	Full (Level IV)
Original sample	LW2-G218	Alta	26445	Full (Level IV)
	26445-PCB Count		20	
Rinsate	LW2-G906	Alta	26472	Summary (III)
Rinsate	LW2-G911	Alta	26472	Summary (III)
Rinsate	LW2-G915	Alta	26472	Summary (III)
Rinsate	LW2-G919	Alta	26472	Summary (III)
Rinsate	LW2-G920	Alta	26472	Summary (III)
Rinsate	LW2-G945	NEA	26472	Summary (III)
	26472-PCB Count		6	
Original sample	LW2-G028	Alta	26478	Summary (III)
Original sample	LW2-G043	Alta	26478	Summary (III)
Original sample	LW2-G057	Alta	26478	Summary (III)
Original sample	LW2-G128	Alta	26478	Summary (III)
Original sample	LW2-G149	Alta	26478	Summary (III)
Original sample	LW2-G184	Alta	26478	Summary (III)
Original sample	LW2-G208	Alta	26478	Summary (III)
Original sample	LW2-G230	Alta	26478	Summary (III)
Original sample	LW2-G241	Alta	26478	Summary (III)
Original sample	LW2-G280	Alta	26478	Summary (III)
Original sample	LW2-G332	Alta	26478	Summary (III)
Original sample	LW2-G347	Alta	26478	Summary (III)
Original sample	LW2-G399	Alta	26478	Summary (III)
Original sample	LW2-G426	Alta	26478	Summary (III)
Original sample	LW2-G434	Alta	26478	Summary (III)
Original sample	LW2-G438	Alta	26478	Summary (III)
Original sample	LW2-G452	Alta	26478	Summary (III)
Original sample	LW2-G492-1	Alta	26478	Summary (III)
Original sample	LW2-G519-1	Alta	26478	Summary (III)
Original sample	LW2-U4Q-1	Alta	26478	Summary (III)
	26478-PCB Count		20	

Portland Harbor

Surface Sediment PCB Congener Sample List

Sample Description	Sample ID	Lab	SDG	Validation Level
Original sample	LW2-G038	Alta	26479	Summary (III)
Original sample	LW2-G093	Alta	26479	Summary (III)
Original sample	LW2-G247	Alta	26479	Summary (III)
Original sample	LW2-G257	Alta	26479	Summary (III)
Original sample	LW2-G298	Alta	26479	Summary (III)
Original sample	LW2-G308	Alta	26479	Summary (III)
Original sample	LW2-G310	Alta	26479	Summary (III)
Original sample	LW2-G328	Alta	26479	Summary (III)
Original sample	LW2-G358	Alta	26479	Summary (III)
Original sample	LW2-G360	Alta	26479	Summary (III)
Original sample	LW2-G402	Alta	26479	Summary (III)
Original sample	LW2-G410-1	Alta	26479	Summary (III)
Original sample	LW2-G439	Alta	26479	Summary (III)
Original sample	LW2-G446	Alta	26479	Summary (III)
Original sample	LW2-G463	Alta	26479	Summary (III)
Original sample	LW2-G485	Alta	26479	Summary (III)
Original sample	LW2-G486	Alta	26479	Summary (III)
Original sample	LW2-G500	Alta	26479	Summary (III)
Original sample	LW2-G509	Alta	26479	Summary (III)
Original sample	LW2-G516	Alta	26479	Summary (III)
	26479-PCB Count		20	
Original sample	LW2-D1-1	Alta	26480	Summary (III)
Field Replicate	LW2-G197-2	Alta	26480	Summary (III)
Original sample	LW2-G233	Alta	26480	Summary (III)
Original sample	LW2-G320	Alta	26480	Summary (III)
Original sample	LW2-G327	Alta	26480	Summary (III)
Original sample	LW2-G335	Alta	26480	Summary (III)
Original sample	LW2-G355	Alta	26480	Summary (III)
Split sample	LW2-G372-3	Alta	26480	Summary (III)
Original sample	LW2-G381	Alta	26480	Summary (III)
Original sample	LW2-G416	Alta	26480	Summary (III)
Original sample	LW2-G447	Alta	26480	Summary (III)
Original sample	LW2-G448	Alta	26480	Summary (III)
Original sample	LW2-G453	Alta	26480	Summary (III)
Original sample	LW2-G473	Alta	26480	Summary (III)
Original sample	LW2-G477	Alta	26480	Summary (III)
Original sample	LW2-G481	Alta	26480	Summary (III)
Original sample	LW2-G490	Alta	26480	Summary (III)
Original sample	LW2-G496	Alta	26480	Summary (III)
Original sample	LW2-G503	Alta	26480	Summary (III)
Original sample	LW2-U2C-2	Alta	26480	Summary (III)
	26480-PCB Count		20	

Portland Harbor

Surface Sediment PCB Congener Sample List

Sample Description	Sample ID	Lab	SDG	Validation Level
Field Replicate	LW2-G139	Alta	26481	Summary (III)
Original sample	LW2-G147	Alta	26481	Summary (III)
Original sample	LW2-G225	Alta	26481	Summary (III)
Original sample	LW2-G273	Alta	26481	Summary (III)
Original sample	LW2-G293	Alta	26481	Summary (III)
Original sample	LW2-G307	Alta	26481	Summary (III)
Split sample	LW2-G339	Alta	26481	Summary (III)
Original sample	LW2-G353-1	Alta	26481	Summary (III)
Original sample	LW2-G364	Alta	26481	Summary (III)
Original sample	LW2-G373	Alta	26481	Summary (III)
Original sample	LW2-G382	Alta	26481	Summary (III)
Original sample	LW2-G386	Alta	26481	Summary (III)
Original sample	LW2-G390	Alta	26481	Summary (III)
Original sample	LW2-G392	Alta	26481	Summary (III)
Original sample	LW2-G440	Alta	26481	Summary (III)
Original sample	LW2-G457	Alta	26481	Summary (III)
Original sample	LW2-G461	Alta	26481	Summary (III)
	26481-PCB Count		17	
Field Replicate	LW2-G198	Alta	26482	Summary (III)
Original sample	LW2-G282	Alta	26482	Summary (III)
Original sample	LW2-G351	Alta	26482	Summary (III)
Original sample	LW2-G371	Alta	26482	Summary (III)
Original sample	LW2-G380	Alta	26482	Summary (III)
Original sample	LW2-G401	Alta	26482	Summary (III)
Original sample	LW2-G417	Alta	26482	Summary (III)
Original sample	LW2-G424	Alta	26482	Summary (III)
Original sample	LW2-G494	Alta	26482	Summary (III)
Original sample	LW2-G506	Alta	26482	Summary (III)
Original sample	LW2-G518	Alta	26482	Summary (III)
	26482-PCB Count		11	
	Total PCB Count		114	

DATA VALIDATION CRITERIA

Table No.: Integral-SVOC

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 1 of 19

Integral - Portland Harbor Site Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	<u>Water:</u> J(+)/UJ(-) if ext. > 7 and < 21 days J(+)/R(-) if ext > 21 days (EcoChem PJ) <u>Solids/Wastes:</u> J(+)/UJ(-) if ext. > 14 and < 42 days J(+)/R(-) if ext. > 42 days (EcoChem PJ) J(+)/UJ(-) if analysis >40 days	1
Tuning	DFTPP Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL= reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF <0.05	5B
	%D <25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > QL	U(+) if sample (+) result is less than QL and less than appropriate 5X or 10X rule (raise sample value to QL)	7
		U(+) if sample (+) result is greater than or equal to QL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Field Blanks	No results > QL	Apply 5X/10X rule; U(+) < action level	6

DATA VALIDATION CRITERIA

Table No.: Integral-SVOC

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 2 of 19

Integral - Portland Harbor Site Semivolatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) if RPD > CL	9
LCS low conc. H2O SVOA	One per lab batch Within method control limits	J(+) assoc. cmpd if > UCL J(+)/R(-) assoc. cmpd if < LCL J(+)/R(-) all cmpds if half are < LCL	10
LCS regular SVOA (H2O & solid)	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD (if required)	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. cmpd. in all samples	9
Surrogates	Minimum of 3 acid and 3 base/neutral compounds Use method acceptance criteria	Do not qualify if only 1 acid and/or 1 B/N surrogate is out unless <10% J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% R T>30 seconds, narrate and Notify PM	19
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	R(+) common laboratory contaminants R(+) target compounds from other fractions See Technical Director for ID issues	4
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

DATA VALIDATION CRITERIA

Table No.: Integral-VOC
Revision No.: 1
Last Rev. Date: 12/12/05
Page: 3 of 19

Integral - Portland Harbor Site Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C±2°C Water: HCl to pH < 2	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Hold Time	Waters: 14 days preserved 7 Days: unpreserved (for aromatics) Solids: 14 Days	J(+)/UJ(-) if hold times exceeded If exceeded by > 3X HT: J(+)/R(-) (EcoChem PJ)	1
Tuning	BFB Beginning of each 12 hour period Method acceptance criteria	R(+/-) all analytes in all samples associated with the tune	5A
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	J(+)/R(-) if RRF < 0.05	5A
	%RSD < 30%	(EcoChem PJ, see TM-06) J(+) if %RSD > 30%	5A
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(EcoChem PJ, see TM-06) If MDL = reporting limit: J(+)/R(-) if RRF < 0.05 If reporting limit > MDL: note in worksheet if RRF < 0.05	5B
	%D < 25%	(EcoChem PJ, see TM-06) If > +/-90%: J+/R- If -90% to -26%: J+ (high bias) If 26% to 90%: J+/UJ- (low bias)	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample (+) result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)	7
		U(+) if sample (+) result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)	7
	No TICs present	R(+) TICs using 10X rule	7
Storage Blank	One per SDG <CRQL	U(+) the specific analyte(s) results in all assoc. samples using the 5x or 10x rule	7
Trip Blank	Frequency as per project QAPP	Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned	18
Field Blanks	No results > QL	Apply 5X/10X rule; U(+) < action level	6
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8

Integral - Portland Harbor Site
Volatile Analysis by GC/MS (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J(+) if RPD > CL	9
LCS <i>low conc. H₂O VOA</i>	One per lab batch Within method control limits	J(+) assoc. compd if > UCL J(+)/R(-) assoc. compd if < LCL J(+)/R(-) all compds if half are < LCL	10
LCS <i>regular VOA (H₂O & solid)</i>	One per lab batch Lab or method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) if %R < 10% (EcoChem PJ)	10
LCS/LCSD (if required)	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. compd. in all samples	9
Surrogates	Added to all samples Within method control limits	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL but > 10% (see PJ1) J(+)/R(-) if < 10%	13
Internal Standards	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J(+) if > 200% J(+)/UJ(-) if < 50% J(+)/R(-) if < 25% R T > 30 seconds, narrate and Notify PM	19
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	R(+) common laboratory contaminants R(+) target compounds from other fractions See Technical Director for ID issues	14
Quantitation/ Identification	RRT within 0.06 of standard RRT Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers	14 21 (false +)

PJ1 No action if there are 4+ surrogates and only 1 outlier.

DATA VALIDATION CRITERIA

Table No.: Integral-GC_ECD

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 5 of 19

Integral - Portland Harbor Site Pesticides/PCBs/Herbicides/Phenols by GC/ECD (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext/analyzed > HT J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ)	1
Resolution Check	Beginning of ICAL Sequence Within RTW Resolution >90%	Narrate (Use Professional Judgement to qualify)	14
Instrument Performance (Breakdown)	DDT Breakdown: < 20% Endrin Breakdown: <20% Combined Breakdown: <30% Compounds within RTW	J(+) DDT NJ(+) DDD and/or DDE R(-) DDT - If (+) for either DDE or DDD J(+) Endrin NJ(+) EK and/or EA R(-) Endrin - If (+) for either EK or EA	5A
Retention Times	Surrogates: TCX (+/- 0.05); DCB (+/- 0.10) Target compounds: elute before heptachlor epoxide (+/- 0.05) elute after heptachlor epoxide (+/- 0.07)	NJ(+)/R(-) results for analytes with RT shifts For full DV, use PJ based on examination of raw data	5B
Initial Calibration	Pesticides: Low=CRQL, Mid=4X, High=16X Multiresponse - one point Calibration %RSD<20% %RSD<30% for surr; two comp. may exceed if <30% Resolution in Mix A and Mix B >90%	J(+)/UJ(-)	5A
Continuing Calibration	Alternating PEM standard and INDA/INDB standards every 12 hours (each preceded by an inst. Blank) %D < 25% Resolution >90% in IND mixes; 100% for PEM	J(+)/UJ(-) J(+)/R(-) if %D > 90% PJ for resolution	5B
Method Blank	One per matrix per batch No results > CRQL	U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL)	7
		U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value)	7
Instrument Blanks	Analyzed at the beginning of every 12 hour sequence No analyte > 1/2 CRQL	Same as Method Blank	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6

Integral - Portland Harbor Site
Pesticides/PCBs/Herbicides/Phenols by GC/ECD (Based on Organic NFG 1999)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (recovery)	One set per matrix per batch Method Acceptance Criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One set per matrix per batch Method Acceptance Criteria	J(+) if RPD > CL	9
LCS	One per SDG Method Acceptance Criteria	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
LCS/LCSD (if required)	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. cmpd. in all samples	9
Surrogates	TCX and DCB added to every sample %R = 30-150%	J(+)/UJ(-) if both %R = 10 - 60% J(+) if both >150% J(+)/R(-) if any %R <10%	13
Quantitation/ Identification	Analyte within RTW on both columns Quantitated using CCV or ICAL CF Lowest value from either column reported %D between columns (25%)	J(+) if RPD = 25-60% (Pest/Aroclor); 40-60% (Herb/Phenol) NJ(+) using PJ if RPD > 60% R(+) using PJ if RPD >90%	3
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used to avoid reporting two results for one sample	11
Sample Clean-up	GPC required for soil samples Florisil required for all samples Sulfur is optional Clean-up standard check %R within CLP limits	J(+)/UJ(-) if %R < LCL J(+) if %R > UCL	14
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na

DATA VALIDATION CRITERIA

Table No.: Integral-TBT

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 7 of 19

Integral - Portland Harbor Site Butyltins by GC/FPD

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	4°C ±2°	J(+)/UJ(-) if greater than 6 deg. C (EcoChem PJ)	1
Holding Time	Water: 7 days from collection Soil: 14 days from collection Analysis: 40 days from extraction	J(+)/UJ(-) if ext/analyzed > HT J(+)/R(-) if ext/analyzed > 3X HT (EcoChem PJ)	1
Initial Calibration	%RSD<30% or correlation co-efficient >0.99	J(high bias), J/UJ(low bias)	5A
Continuing Calibration	%D < 25%	J(high bias), J/UJ(low bias)	5B
Method Blank	One per matrix per batch	U(+) if sample result is < CRQL and < 5X rule (raise sample value to CRQL)	7
		U(+) if sample result is > or equal to CRQL and < 5X rule (at reported sample value)	7
Instrument Blanks	Analyzed at the beginning of every 12 hour sequence No analyte > MRL	Same as Method Blank	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
MS/MSD (recovery)	One set per matrix per batch Method Acceptance Criteria	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8
MS/MSD (RPD)	One set per matrix per batch Method Acceptance Criteria	J(+) if RPD > CL	9
LCS	One per SDG Method Acceptance Criteria	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R <<LCL (< 10%)	10
LCS/LCSD (if required)	One set per matrix and batch of 20 samples RPD < 35%	J(+) assoc. cmpd. in all samples	9
Surrogates	tri-n-propyltin added to every sample %R = Laboratory control limits	J(+)/UJ(-) if both %R = 10 - 60% J(+) if both >150% J(+)/R(-) if any %R <10%	13
Quantitation/ Identification	Analyte within RTW on both columns Quantitated using ICAL CF Higher value from either column reported %D between columns (40%)	J(+) if RPD = 40 - 60% NJ(+) if RPD >60% EcoChem PJ - See TM-08	3

DATA VALIDATION CRITERIA

Table No.: Integral-TBT

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 8 of 19

Integral - Portland Harbor Site Butyltins by GC/FPD

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used to avoid reporting two results for one sample	11
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na

DATA VALIDATION CRITERIA

Table No.: Integral-HRMS

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 9 of 19

Integral - Portland Harbor Site Compounds Analyzed By HRMS (Methods 1613B or SW846 - 8290) Phthalates, Polycyclic Aromatic Hydrocarbons (PAH), PCB Congeners and Dioxins/Furans

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature	Waters/Solids <4°C Tissues <10°C	EcoChem PJ, see TM-05	1
Holding Time	Water: 30 days from collection Soil: 30 days from collection Analysis: 40 days from extraction Note: Under CWA, SDWA, and RCRA the HT for H2O is 7 days	J(+)/UJ(-) if ext > 30days J(+)/UJ(-) if analysis > 40 Days EcoChem PJ, see TM-05	1
Mass Resolution	>=10,000 resolving power at m/z 304.9824 Exact mass of m/z 380.9760 w/in 5 ppm of theoretical value (380.97410 to 380.97790) . Analyzed prior to ICAL and at the start and end of each 12 hr. shift	R(+/-) if not met	14
Window Defining Mix and Column Performance Mix	Window defining mixture/Isomer specificity std run before ICAL and CCAL Valley < 25% (valley = (x/y)*100%) x = ht. of TCDD y = baseline to bottom of valley For all isomers eluting near 2378-TCDD/TCDF isomers (TCDD only for 8290)	J(+) if valley > 25%	5A (ICAL) 5B (CCAL)
Initial Calibration	ICAL: Minimum of five standards %RSD < 20% for native compounds %RSD <30% for labeled compounds (%RSD <35% for labeled compounds under 1613b)	J(+) natives if %RSD > 20%	5A
	Abs. RT of ¹³ C ₁₂ -1234-TCDD >25 min on DB5 >15 min on DB-225	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10 for all native and labeled compounds in CS1 std.	If <10, elevate Det. Limit or R(-)	

DATA VALIDATION CRITERIA

Table No.: Integral-HRMS

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 10 of 19

Integral - Portland Harbor Site Compounds Analyzed By HRMS (Methods 1613B or SW846 - 8290) Phthalates, Polycyclic Aromatic Hydrocarbons (PAH), PCB Congeners and Dioxins/Furans

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Continuing Calibration	Analyzed at the start and end of each 12 hour shift. %D +/- 20% for native compounds %D +/- 30% for labeled compounds (Must meet limits in Table 6 for 1613B) (If %Ds in the closing CCAL are w/in 25%/35% the avg RF from the 2 CCAL may be used to calculate sam	J(+)/UJ(-) natives if %D = 30% - 75% R(+/-) if %D > 75%	5B
	Abs. RT of ¹³ C ₁₂ -1234-TCDD and ¹³ C ₁₂ -123789-HxCDD +/- 15 sec of ICAL.	EcoChem PJ, see ICAL section of TM-05	
	RRT of all other compounds must meet table 2 of 1613B.	EcoChem PJ, see TM-05	
	Ion Abundance ratios within QC limits (Table 8 of method 8290) (Table 9 of method 1613B)	EcoChem PJ, see TM-05	
	S/N ratio > 10	EcoChem PJ, see ICAL section of TM-05	
Method Blank	One per matrix per batch No positive results	If sample result < 5X action level, qualify U at reported value. (< 10X for phthalates)	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
LCS / OPR	Concentrations must meet limits in Table 6 of method 1613B or lab limits.	J(+) if %R > UCL J(+)/UJ(-) if %R < LCL J(+)/R(-) using PJ if %R << LCL (< 10%)	10
MS/MSD (recovery)	May not analyze MS/MSD %R should meet lab limits.	Qualify parent only unless other QC indicates systematic problems: J(+) if both %R > UCL J(+)/UJ(-) if both %R < LCL J(+)/R(-) if both %R < 10% PJ if only one %R outlier	8

DATA VALIDATION CRITERIA

Table No.: Integral-HRMS

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 11 of 19

Integral - Portland Harbor Site Compounds Analyzed By HRMS (Methods 1613B or SW846 - 8290) Phthalates, Polycyclic Aromatic Hydrocarbons (PAH), PCB Congeners and Dioxins/Furans

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
MS/MSD (RPD)	May not analyze MS/MSD RPD < 20%	J(+) if RPD > CL	9
Lab Duplicate	RPD < 25% if present.	J(+) if outside limits	9
Labeled Compounds / Internal Standards	<i>Method 8290</i> : %R = 40% - 135% in all samples	J(+)/UJ(-) if %R = 10% - LCL J(+) if %R > UCL J(+)/R(-) if %R < 10%	13
	<i>Method 1613B</i> : %R must meet limits specified in Table 7		
Quantitation/ Identification	SIM ions for analyte, lstd. rec. std. Max w/in 2 sec. S/N > 2.5 IA ratios meet limits in Table 9 of 1613B or Table 8 of 8290 RRTs w/in limits in table 2 of 1613B	If RT criteria not met, use PJ (see TM-05) If S/N criteria not met, J(+). if unlabelled ion abundance not met, change to EMPC If labelled ion abundance not met, J(+).	21
EMPC (estimated maximum possible concentration)	If quantitation identification criteria are not met, laboratory should report an EMPC value.	If laboratory correctly reported an EMPC value, qualify with U to indicate that the value is a detection limit.	14
Interferences	PCDF interferences from PCDPE	If both detected, change PCDF result to EMPC	14
Second Column Confirmation	All 2378-TCDF hits must be confirmed on a DB-225 (or equiv) column. All QC specs in this table must be met for the confirmation analysis.	Report lower of the two values. If not performed use PJ (see TM-05).	3
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na
Two analyses for one sample	Report only one result per analyte	"DNR" results that should not be used	11

DATA VALIDATION CRITERIA

Table No.: Integral-ICP

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 12 of 19

Integral - Portland Harbor Site Metals by ICP (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	4°C ±2° Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	Professional Judgment J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	180 days	Professional Judgment J(+)/UJ(-)	1
Initial Calibration	Blank + minimum 1 standard once every 24 hours if more than 1 standard $r > 0.995$	Professional Judgment J(+)/UJ(-) if $r < 0.995$ (multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source analyzed immed. after cal. %R within +/- 10% of true value	Professional Judgment J(+)/UJ(-) if %R 75%-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Cal Verification (CCV)	Every ten samples, immed. Before samples+ and end of run %R within +/- 10% of true value	Professional Judgment J(+)/UJ(-) if %R = 75%-89% J(+) if %R 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B
CRI Standard (to check CRDL)	2X CRDL (or 2X IDL if greater) analyzed beginning and end of run (at least 8 hrs) Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Sb, Pb, Tl)	Professional Judgment R(-), (+) < 2XCRDL if %R < 50% (< 30% Sb, Pb, Tl) J(+) < 2XCRDL, UJ(-) if %R 50-69% (30%-49% Sb, Pb, Tl) J(+) < 2X CRDL if %R 130%-180% (150%-200% Sb, Pb, Tl) R(+)<2X CRDL if %R>180%(200% Sb, Pb, Tl)	14
Initial and Continuing Cal Blanks (ICB/CCB)	after each ICV and CCV every ten samples and end of run blank < +/- IDL	Action level is 5x abs. value of blk conc. For (+) blk value, U(+) values < action level For (-) blk value, J(+)/UJ(-) values < action level	7
Prep Blank	One per matrix per batch (not to exceed 20 samples)	Action level is 5x abs. value of blk conc. For (+) blk value, U(+) values < action level For (-) blk value, J(+)/UJ(-) values < action level	7
Interference Check Samples ICSA/ICSAB	Beginning and end of each run or every eight hours ICSAB +/- 20% ICSA < +/- IDL	For samp with Al,Ca,Fe,Mg > ICS levels R(+/-) if %R<50% J(+) if %R >120% J(+)/UJ(-) if %R= 50% to 79% Professional Judgment ICSA	17
Post Digestion Spike	If ICP Matrix Spike is outside 75-125%, spike at twice the sample conc.	No Quals assigned based on this element	

DATA VALIDATION CRITERIA

Table No.: Integral-ICP

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 13 of 19

Integral - Portland Harbor Site Metals by ICP (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Matrix Spike	One per matrix per batch 75-125% for samples less than 4 x spike level	J(+) if %R>125% J(+)/UJ(-) if %R <75% J(+)/R(-) if %R<30%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x CRDL Diff <CRDL for samples >CRDL and <5 x CRDL (may use RPD < 35%, Diff < 2X CRDL for solids)	J(+)/UJ(-) if RPD > 20% or diff > CRDL	9
Serial Dilution	5x dilution one per matrix %D <10% for values > 50x IDL	J(+)/UJ(-) if %D >10%	16
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na
Instrument Detection Limit	determined every 3 months	Professional Judgment	14
Linear Range	determined yearly samples diluted to fall within range	J(+) values over range	20

DATA VALIDATION CRITERIA

Table No.: Integral-ICPMS

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 14 of 19

Integral - Portland Harbor Site Metals by ICP-MS (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	4°C ±2° Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	Professional Judgment J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	180 days	Professional Judgment J(+)/UJ(-) if holding time exceeded J(+)/R(-) if HT exceeded by 3x	1
Tune	Prior to ICAL Analyzed 5 times wih Std Dev. ≤ 5% mass calibration <0.1 amu from True Value Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height	Professional Judgment No Tune - R all results criteria not met - J(+)/UJ(-)	5A
Initial Calibration	Mininum Blank+1 Standard every 24 hours	Professional Judgment J(+)/UJ(-) >24 hours J(+)/UJ(-) if r<0.995 (for multi point cal)	5A
Initial Calibration Verification (ICV)	Independent source; analyzed post ICAL and prior to samples +/-10% of the True value	Professional Judgment J(+)/UJ(-) if %R 75%-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5A
Continuing Cal Verification (CCV)	Every 10 samples,post ICV/ICB and end of run +/- 10% of True value	professional judgment J(+)/UJ(-) if %R 75%-89% J(+) if %R = 111-125% R(+) if %R > 125% R(+/-) if %R < 75%	5B
CRDL Standard (CRI)	2X CRDL (or 2X IDL if greater) analyzed beginning and end of run (at least 8 hrs) Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Co,Mn, Zn)	Professional judgment R(-),(+)<2XCRDL if %R <50% (< 30% Co,Mn, Zn) J(+)<2XCRDL, UJ(-) if %R 50-69% (30%-49% Co,Mn, Zn) J(+)<2X CRDL if %R 130%-180% (150%-200% Co,Mn, Zn) R(+)<2X CRDL if %R>180%(200% Co,Mn, Zn)	14
Initial and Continuing Cal Blanks (ICB/CCB)	after each ICV and CCV every ten samples and end of run blank < +/- IDL	Action level is 5x abs. value of blk conc. For (+) blk value, U(+) values < AL For (-) blk value, J(+)/UJ(-) values < AL	7
Prep Blank	One per matrix per batch (not to exceed 20 samples)	Action level is 5x abs. value of blk conc. For (+) blk value, U(+) values < AL For (-) blk value, J(+)/UJ(-) values < AL	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6

DATA VALIDATION CRITERIA

Table No.: Integral-ICPMS

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 15 of 19

Integral - Portland Harbor Site Metals by ICP-MS (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Interference Check Samples ICSA/ICSAB	ICSAB +/- 20% of true value ICSA < +/- IDL	Where Al,Ca,Fe,Mg = ICS levels J(+) if %R >120% J(+)/UJ(-) if %R = 50% to 79% R(+/-) if %R<50% Professional Judgment for ICSA > +/- IDL	17
Post Digestion Spike	If ICP Matrix Spike is outside 75-125% Spike parent sample at 2X the sample conc.	Use Professional Judgment - usually no action	14
Matrix Spike	One per matrix, batch and SDG 75-125% for samples where results do not exceed 4x spike level	J (+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30% UJ(-) if %R = 30-74%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x CRDL Diff<CRDL for samples >CRDL and <5 x CRDL (may use RPD < 35%, Diff < 2X CRDL for solids)	J(+)/UJ(-) associated samples if RPD > 20% or diff > CRDL	9
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Serial Dilution	5x dilution one per matrix (or SDG) %D <10% of the undiluted value for values > 50x IDL	J(+)/UJ(-) if %D >10%	16
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na
Internal Standards	Every Sample 60%-125% of ICAL IS	J (+)/UJ (-) analytes associated with IS outlier	19
Instrument Detection Limit	Determined every 3 months	Professional Judgment	14
Linear Range	determined yearly samples diluted to fall within range	J(+) values over range	20

DATA VALIDATION CRITERIA

Table No.: Integral-HG

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 16 of 19

Integral - Portland Harbor Site Mercury by CVAA (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	4°C ±2° Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	Professional Judgment J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	28 days from date sampled	Professional Judgment J(+)/UJ(-) if holding time exceeded	1
Initial Calibration	Blank + 4 standards r > 0.995 once every 24 hours	Professional Judgment J(+)/UJ(-) if r<0.995	5A
Initial Calibration Verification (ICV)	Independent source analyzed immediately after cal. %R within +/- 20% of true value	Professional Judgment R(+/-) if %R < 65% R(+) if %R > 135% J(+)/UJ(-) if %R = 65%-79% J(+) if %R = 121-135%	5A
Continuing Cal Verification (CCV)	Every ten samples, immed. following ICV/ICB and end of run %R within +/- 20% of true value	R(+/-) if %R < 65% R(+) if %R > 135% J(+)/UJ(-) if %R = 65%-79% J(+) if %R = 121-135%	5B
CRDL Standard (CRA)	Beginning of run after ICV/ICB CCV/CCB Conc = CRDL 70% - 130%	Professional Judgment R(-),(+) < 2XCRDL if %R < 50% J(+) < 2XCRDL, UJ(-) if %R 50-69% J(+) < 2X CRDL if %R 130%-180% R(+) < 2X CRDL if %R > 180%	14
Initial and Continuing Cal Blanks (ICB/CCB)	After each ICV and CCV every ten samples and end of run blank < +/- IDL	Action level is 5x abs. value of blk conc. For (+) blk value, U(+) sample values < AL For (-) blk value, J(+)/UJ(-) sample values < AL	7
Prep Blank	One per matrix per batch (not to exceed 20 samples)	Action level is 5x abs. value of blk conc. For (+) blk value, U(+) sample values < AL For (-) blk value, J(+)/UJ(-) sample values < AL	7
Matrix Spike	One per matrix per batch 5% frequency 75-125% for samples less than 4x spike level	J(+) if %R > 125% J(+)/UJ(-) if %R < 75% J(+)/R(-) if %R < 30%	8
Laboratory Duplicate	One per matrix per batch RPD < 20% for samples > 5x CRDL (+/-)CRDL for samples > CRDL and < 5 x CRDL (may use RPD < 35%, Diff < 2X CRDL for solids)	J(+)/UJ(-) if RPD > 20% or diff > CRDL	9

DATA VALIDATION CRITERIA

Table No.: Integral-HG
Revision No.: 1
Last Rev. Date: 12/12/05
Page: 17 of 19

Integral - Portland Harbor Site Mercury by CVAA (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50%; J(+) if %R > 120% J(+)/UJ(-) if %R = 50-79%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Field Duplicates	No specific QAPP limits Use RPD < 35% (water) or < 50% (soil)	Narrate; do not qualify.	na
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	J(+)/UJ(-) in parent samples only	9

DATA VALIDATION CRITERIA

Table No.: Integral-AA Hydride

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 18 of 19

Integral - Portland Harbor Site Metals by AA-Hydride (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Cooler Temperature and Preservation	4°C ±2° Water Only: Nitric Acid to pH < 2 For Dissolved metals, 0.45 um filter preserve after filtration	J(+)/UJ(-) if preservation requirements are not met	1
Holding Time	180 Days from collection	J(+)/UJ(-) >180 Days	1
Initial Calibration	Blank + 3 standards (1 at CRDL) every 24 hours; r>0.995	R(+/-) if <5 standards or >24 hours J(+)/UJ(-) if r<0.995	5A
Initial Calibration Verification (ICV)	Independent source > CRA std. conc. Post ICAL & prior to samples +/-10% of the True value	J(+) if %R < 75% J(+)/UJ(-) if %R = 75%-89% J(+) if %R = 111-125% R(-) if %R<75% R(+) if %R>125%	5A
Continuing Cal Verification (CCV)	Every 10 samples, post ICV/ICB and end of run +/- 10% of True value	J(+) if %R < 75% J(+)/UJ(-) if %R 75%-89% J(+) if %R 111-125% R(-) if %R<75% R(+) if %R>125%	5B
CRDL Standard (CRA)	@ CRDL; analyzed beginning of run %R = 70%-130%	professional judgment %R <50% - R(-), (+) <2X CRDL %R 50-69% - J(+) <2X CRDL, UJ(-) %R 130%-180% - J(+) <2X CRDL %R>180% - R(+)< 2X CRDL	14
Initial and Continuing Cal Blanks (ICB/CCB)	After each ICV and CCV - every ten samples (or 2 hours) and end of run blank < IDL and > -CRDL	Action level 5x(+)/5x(-) For positive blank hit, U(+) values < AL For negative blank hit, J(+)/UJ(-) < AL	7
Prep Blank	One per matrix per batch (Max 20 samples)	Action level 5x(+)/5x(-) For positive blank hit, U(+) values < AL For negative blank hit, J(+)/UJ(-) < AL	7
Field Blanks	No results > QL	Apply 5X rule; U(+) < action level	6
Matrix Spike	One per matrix, batch and SDG 75-125% for samples where results do not exceed 4x spike level	J (+) if %R > 125% J(+)/UJ(-), %R < 75% J(+)/R(-), %R < 30% UJ(-), %R 30-74%	8
Laboratory Duplicate	One per matrix per batch RPD <20% for samples > 5x CRDL (+/-)CRDL for samples >CRDL and <5 x CRDL (may use RPD < 35%, Diff < 2X CRDL for solids)	J(+)/UJ(-) associated samples if RPD > 20% or diff > CRDL	9

DATA VALIDATION CRITERIA

Table No.: Integral-AA Hydride

Revision No.: 1

Last Rev. Date: 12/12/05

Page: 19 of 19

Integral - Portland Harbor Site Metals by AA-Hydride (Based on Inorganic NFG 1994 & 2002)

VALIDATION QC ELEMENT	ACCEPTANCE CRITERIA	ACTION	REASON CODE
Laboratory Control Sample	Waters: One per matrix per batch %R (80-120%)	R(+/-) if %R < 50% J(+)/UJ(-) if %R = 50-79% J(+) if %R >120%	10
	Soils: One per matrix per batch Result within manufacturer's certified acceptance range	J(+)/UJ(-) if < LCL, J(+) if > UCL	10
Field Duplicates	QAPP specified RPD < 50% (sediment & water)	Narrate; do not qualify.	na
Linear Range	Sample results must be less than 110% of high standard	J(+) values over range	20